

**DETECTION OF *O*-NITROPHENOL IN WATER SAMPLES BY
USING HIGH PERFORMANCE LIQUID
CHROMATOGRAPHY (HPLC)**

IFFAH SYAZANA BINTI RUSLI

**Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

JULY 2017

This Final Year Project Report entitled “**Detection of *o*-nitrophenol in Water Samples by Using High Performance Liquid Chromatography**” was submitted by Iffah Syazana binti Rusli, in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences, and was approved by

Nor Monica binti Ahmad
Supervisor
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000 Kuala Pilah
Negeri Sembilan

Nurul Huda binti Abdul Halim
Project Coordinator
B. Sc. (Hons.) chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000 Kuala Pilah
Negeri Sembilan

Mazni binti Musa
Head of Programme
B. Sc. (Hons.) chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000 Kuala Pilah
Negeri Sembilan

Date: _____

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	x
ABSTRAK	xi
CHAPTER 1 INTRODUCTION	
1.1 Background of study	1
1.2 Problem statements	3
1.3 Significant study	4
1.4 Objectives	4
CHAPTER 2 LITERATURE REVIEW	
2.1 Phenol	5
2.1.1 Source of phenol in environment	7
2.2 Phenolic compound	7
2.3 High performance liquid chromatography (HPLC)	10
2.4 Solid phase extraction (SPE)	14
2.5 Recent study for detection of phenolic compound by using HPLC	15
CHAPTER 3 METHODOLOGY	
3.1 Materials	25
3.2 Preparation of standard stock solution of <i>o</i> -nitrophenol	25
3.3 Preparation of sample using solid phase extraction (SPE)	26
3.4 Analysis of HPLC	28
3.5 Optimization	28
3.5.1 Optimization of flow rate	28
3.5.2 Optimization of column temperature	29
3.5.3 Optimization of composition of mobile phase	30
3.5.4 Optimization of flow wavelength	31
CHAPTER 4 RESULTS AND DISCUSSION	
4.1 Optimization of study	32
4.1.1 Effect of flow rate	32
4.1.2 Effect of temperature	33

4.1.3	Effect of composition of mobile phase	35
4.1.4	Effect of wavelength	37
4.2	Method validation	38
4.2.1	Calibration curve	38
4.2.2	Limit of detection (LOD)	39
4.2.3	Limit of quantification (LOQ)	40
4.3	Analysis of water samples	40
 CHAPTER 5 CONCLUSION AND RECOMMENDATIONS		
5.1	Conclusion	42
5.2	Recommendations	42
 CITED REFERENCES		44
APPENDICES		48
<i>CURRICULUM VITAE</i>		53

ABSTRACT

DETECTION OF *O*-NITROPHENOL IN WATER SAMPLES BY USING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)

Phenolic compound such as *o*-nitrophenol can be presented in the environment. Yet, in the water which will be consumed by the living organism. Due to its toxicity, it will give an effect towards the consumer. Thus, in this research, *o*-nitrophenol in water samples was detected by using HPLC-UV detector. There were few parameters were optimized which are effect of flow rate, column temperature, composition of mobile phase and wavelength by using 30 ppm of standard stock solution of *o*-nitrophenol. This analysis used C₁₈ column as its stationary phase with isocratic elution of methanol:1% acetic acid (70:30) as the mobile phase. From the results obtained, the optimum flow rate, column temperature, composition of mobile phase and wavelength were 0.75 mL/min, 26°C, methanol:1% acetic acid (70:30) and 274 nm respectively. Solid phase extraction (SPE) method was used as an extraction method of water samples. At the end of this analysis, the analytical method was validated according to various parameter such as calibration curve, limit of detection (LOD), limit of quantification (LOQ), relative standard deviation (RSD%) and accuracy. For calibration curve ranging 5 ppm to 70 ppm, a good linear correlation coefficient was observed with $R^2 = 0.997$. Next, for calculated LOD and LOQ were 0.031 ppm and 0.102 ppm respectively. Lastly, RSD% for sample A was 0.853% and sample B was 0%. Thus, it can be conclude that *o*-nitrophenol presence in the environment due to the decomposition of wood and leaves.